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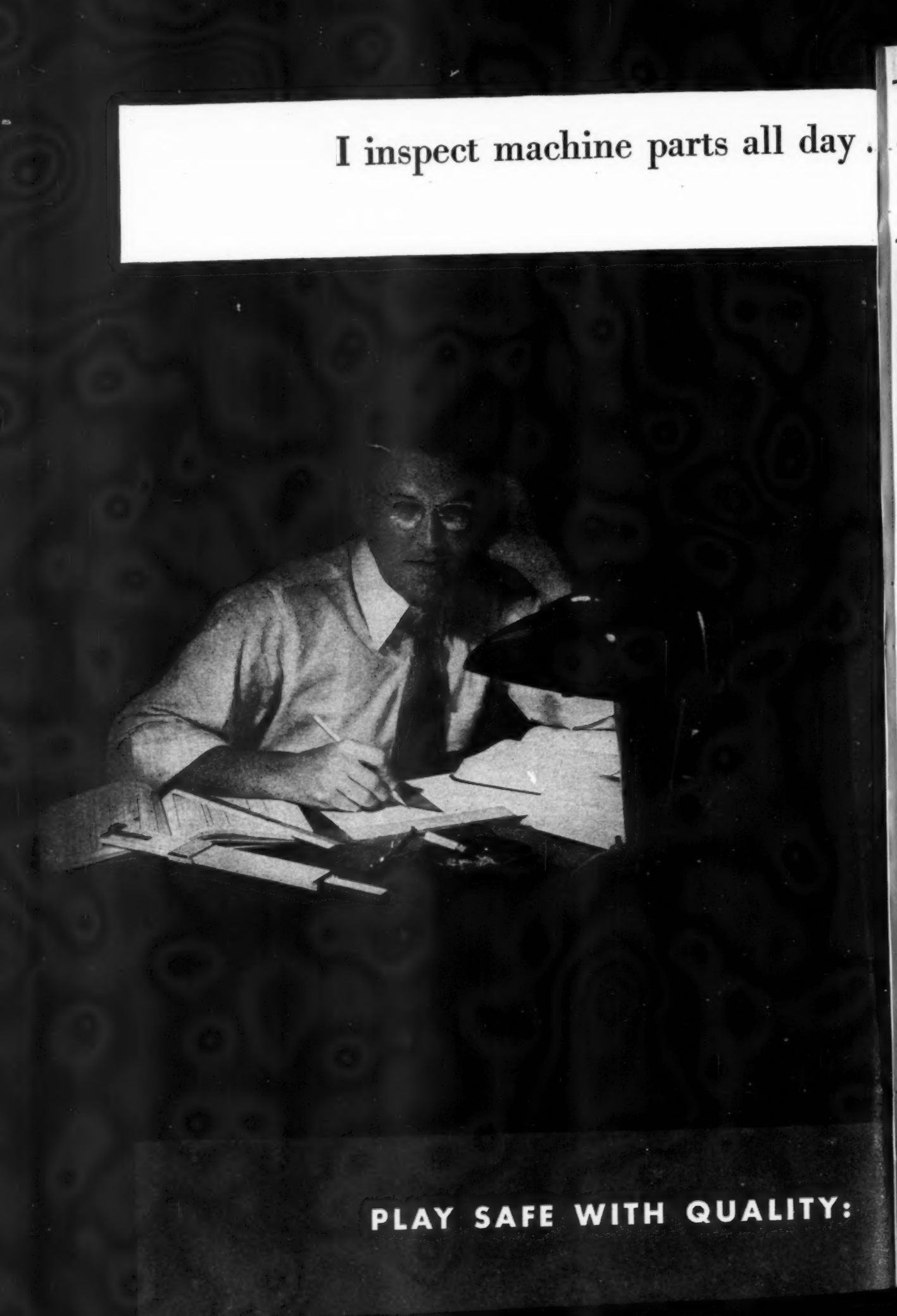
I inspect machine parts all day.



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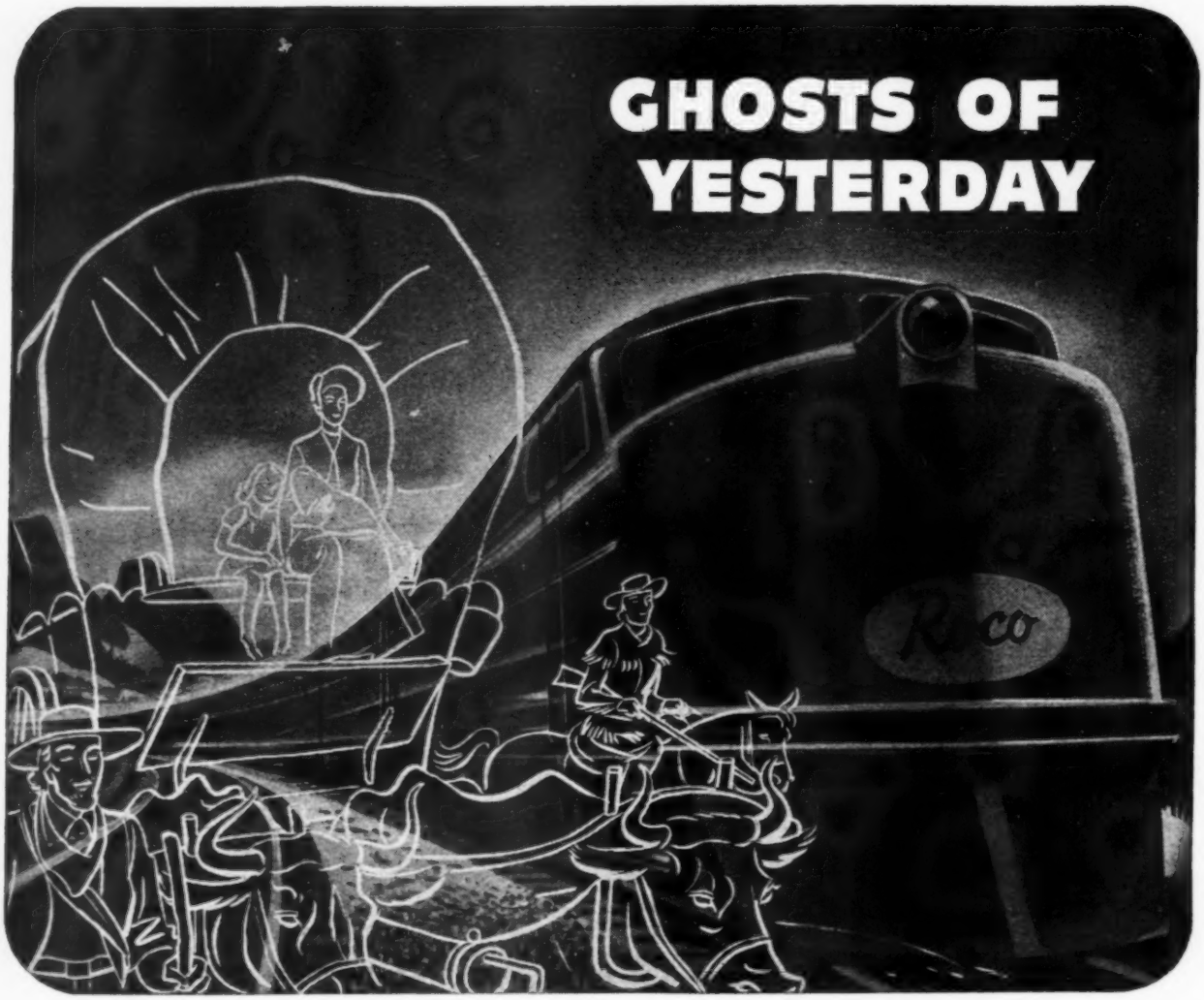


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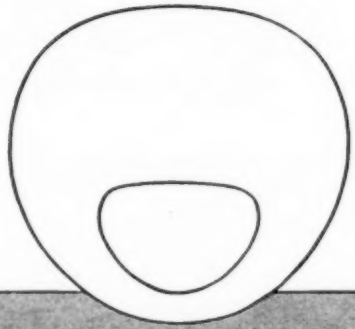

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AMERICAN JOURNAL OF OPTOMETRY
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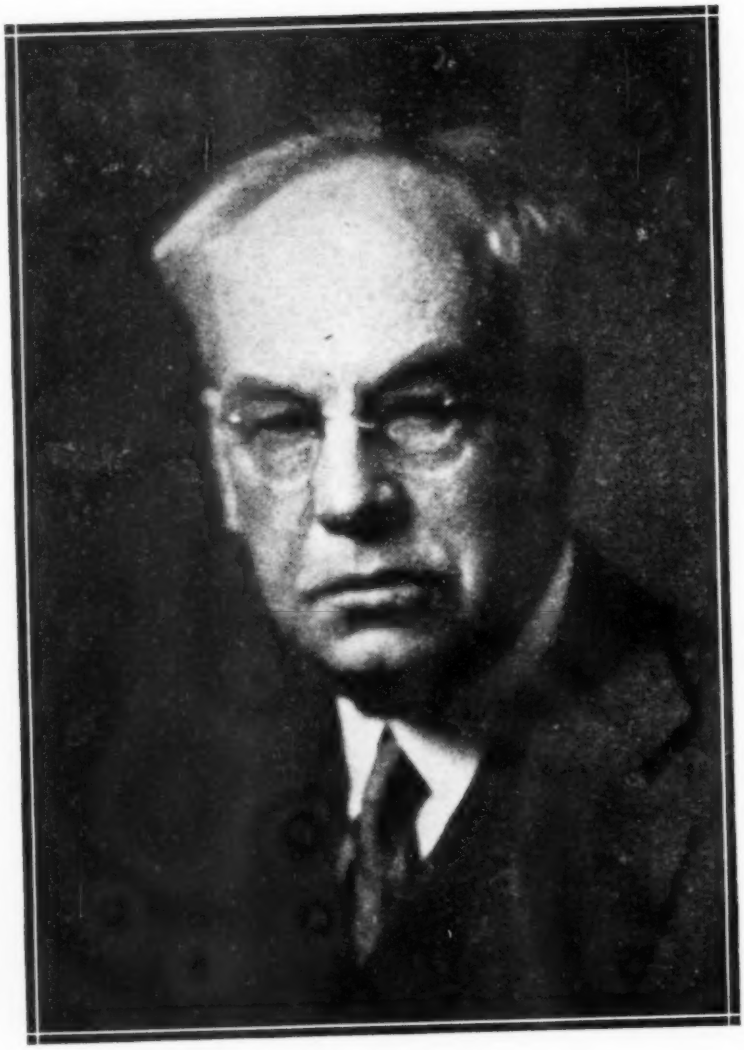
Vol. 19 FEBRUARY, 1942 No. 2

# FOREWORD

In honor of his outstanding service to Optometry, and in special recognition of his distinguished career, which happily remains unabated, this issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY is dedicated to Professor James P. C. Southall, by his pupils, fellow workers and optometric colleagues in America.



James P. C. Southall

# AN APPRECIATION OF JAMES P. C. SOUTHALL, M. A.

Emeritus Professor of Physics and Director of the
Professional Courses in Optometry (1914-1940), Columbia University
with
Comments on Optical and Optometric Education
During the Past Twenty-five Years

by

Charles Sheard, Ph.D., Sc.D.,
Professor of Biophysics and Director of the
Division of Physics and Biophysical Research,
The Mayo Foundation (University of Minnesota)
Rochester, Minnesota

These are the closing hours of the old year—1941, and soon I shall hear the pause on the radio, the count of twelve, the ringing in of the New Year, the blare of the trumpets and the blasts of horns in the great American metropolis, blown in the hope that there may be some real happiness, peace and salvation brought to sick men and women in a war-stricken world and that 1942 may, as Mr. Churchill said, see us a united people—united in the same philosophy of life—so that we may, "for the good of all, walk together in majesty, in justice and in peace."

And, as the good lady of the manor—who sits beside me in these closing hours of not only the old year but also of the anniversary of the beginning of the happy journey together through life—and I are reminiscing, as we always do when we are fortunate to be with each other under the spell of the memories of happy days and happy faces, we are dotting our conversations with many interruptions, naming the names of many friends, speaking of the greatness of many men and women, (not only in this citadel of medicine and care for the sick but even unto

the four quarters of the earth) whom it has been our good fortune to know. Just why I should have reached into the portfolio of *Men and Things* to withdraw a letter of 5 April 1941 from my esteemed colleague, Professor James P. C. Southall, written as he stated "today, just as I have rounded out yesterday threescore and ten," I cannot say other than, guided by my first love of things optical, I knew that in that portfolio were materials which I, and many others like me, trudging through life would wish to have recorded, so that our children and our children's children might know something of the educational leaders and great teachers who were concerned with the things of vision in the day and age in which we have lived.

I have been scratching my head and trying to recollect just when it was that I had the good fortune to stand face to face with Professor Southall. To aid my memory I have turned to those books which record the names and some of the accomplishments of outstanding men and women in these United States—such as *Who's Who in America*, and *American Men of Science*—and I find (and I shall quote from the contents of these brief biographical sketches of Southall in a succeeding paragraph) that he became the director of the professional courses in optometry at Columbia University in 1914. I feel like italicizing or putting in heavy face type the numerals 1914 and, in writing this sketch of my friend and scientific colleague in physiological optics, I hope I may be pardoned the rehearsal of an event in my own life centered very definitely around 1914. For on August 4, 1914 (the same day that war between Great Britain and Germany was declared and the die was cast), there was introduced into the Ohio State University at Columbus, Ohio, the course in vision optics and optometry, and I had the honor of becoming the first professor and director shortly after the acceptance of this course (then two years in length and increased to four years in 1915 with a university degree, thereby being the first institution of higher learning to grant such recognition to optometry). I went with Dr. John C. Eberhardt, of Dayton, Ohio, to New York City to visit and consult primarily with three men whose names are well-known in the ranks of optometry as a profession, in connection with the courses at Columbia University and in vision as a science — Andrew Jay Cross, Charles F. Prentice and James P. C. Southall; the first known to all of us for his dynamic skiametry, the second for his masterly treatises on ophthalmic lenses and the establishment of the prism

diopter, and the third for his scholarly leadership. Memory says that I did not meet Southall on this occasion, for we had spent a day or so with Cross and Prentice, it was 95° F. or more in the shade in New York City, the week end was at hand, and Eberhardt and I left for the comforts of the Adirondack mountains and lakes. But Southall's name and optical contributions were known to all of us; we rejoiced in his appointments to the faculty of Columbia University. So, then, while I am sure that I did not meet Southall in person in 1914 I did have the privilege of knowing him through the medium of correspondence and sometime within the next year or two had the pleasure of shaking his hand and visiting with him in his classroom. And I came to a greater appreciation and understanding of this scholarly gentleman as the years came and went, for it was my privilege to see him and to speak before his students at Columbia University at least once a year during the period of 1919-1924 when I was associated with the American Optical Company as director of the division of ocular and professional interests and editor of the *American Journal of Physiological Optics*.

When students come to their final examinations for master's degrees or their doctorates, they are crammed full of facts and information (we hope) about theories, methods, results and conclusions, but little do they know about the names of men and women (and some of the outstanding events in their lives) who have been responsible for these developments. I suppose it is true of all of us that we must increase in years and gain in experience before the man—the worker—is as worthy of consideration and remembrance as are the things—the work —accomplished. I can well imagine that most optometrists and ophthalmologists knew that there were some very erudite contributions and, to the untrained and uninitiated, books that were literally closed to them, having to do with geometrical, physical and physiological optics written by a college professor. And parenthetically we may state without fear of refutation that the great seats of learning are and doubtless will continue to be at the universities, with the professors who are masters of their subjects and under whose guidance come only those who have acquired the requisite preliminary training. So every profession must have amongst its outstanding leaders its professors, with their partial or even total retirement from the men and things of everyday life in order that they may labor as the spirit moves them, and open up new avenues of approach, so that there may be new ideas and new ideals.

One of the college professors who has contributed to the various branches or phases of optics and, particularly, applications to vision is thus described to us in some detail in *Who's Who* (taken largely from the 1938-39 edition) and *American Men of Science.*

*SOUTHALL, James Powell Cooke;* professor physics; born, Norfolk, Va., April 4, 1871; son James Cooke and Eliza Frances (Sharp) S.; McGuire's School, Richmond, Va.; Richmond College, Va.; B. A. University of Virginia, 1891; M. A., 1893; fellow Johns Hopkins, 1898; married Jeannie Oliver Abbot, of Bellevue, Va., Dec. 23, 1899; children—James Cooke (dec.), William Richardson Abbot. Teacher McGuire's School, 1890-91; instructor in physics, Univ. of Virginia, 1891-93; professor physics and mathematics, Miller Manuel Training School, Albermarle, Va., 1893-98; professor physics, Hobart College, Geneva, N. Y., 1899-1901; professor physics Alabama Polytechnic Institute, 1901-1914; assistant professor physics 1914-17, associate professor 1917-22 and professor 1922-1940 Columbia University and director of professional courses in optometry from 1914 to the date of his retirement (October 1, 1941). At that time he became emeritus professor of physics. Fellow of Physical Society, American Association for the Advancement of Science, Optical Society (London); member Franklin Institute, Optical Society of America (president 1921); member of honorary scientific society Sigma Xi and of Phi Beta Kappa. Member Optical Munitions Board; committee on Physiological Optics, National Research Council, and Distinguished Service Foundation Medallist in optometry 1930. Author of *Principles and Methods of Geometrical Optics, especially as Applied to the Theory of Optical Instruments,* 1910; *Mirrors, Prisms and Lenses,* 1918 (rev. ed. 1923; 3rd enlarged edition 1933); *Introduction to Physiological Optics,* 1937; and numerous scientific papers, essays and addresses. Editor-in-chief of the *American Edition* of Helmholtz's *Physiological Optics;* and translator of this monumental treatise (1924-25). Address: Edgewood Lane, University; Charlottesville, Virginia.

A scanning of these data shows that Professor Southall was interested very actively in and associated educationally with optometry for a period of a quarter of a century. Some of us, like Southall, became interested in optometry and believed that it might have a definite sphere of usefulness and a real service to the public in the days when it was beginning slowly—oh, so slowly—to desire to remove itself from the jeweler's store and bench and when "specs" were sold at so much and,

if the customer didn't bat an eye, the seller added "for each lens." It was strictly a merchandising age; often a dirty test chart, and frequently as dirty an operator, with poor and insufficient illumination, a non-descript trial case with finger-printed lenses and a loosely toggled trial frame, no examination fee (no need for one on the part of opticians, optometrists, oculists or what have you for, with rare exceptions, none of them knew much about what it was all about), large diplomas bought for various sums and from various places (sometimes medical diploma mills) spread on the walls, many of them conferring exalted titles and degrees—all in conformity with the things of the good old days of the horse and buggy, oil lamps, wall telephones, and so on down the line. So, to put it mildly, some few came into optometry in the early 1900's as physicists and opticists in the hope that some reasonable modicum of knowledge regarding mirrors, lenses and prisms, and some of the fundamental subjective tests on myopia, hyperopia and 'stigmatism (as it was called frequently), might be acquired from schools that possessed a faculty and a staff (small though it might be) which, in turn, had both a head and a heart. Optometry, and for that matter also ophthalmology, owes a debt which is difficult to repay to those physicists who departed from the straight and narrow path of the pure, unadulterated and unsullied ranks to interest themselves in folks who applied some of the principles of physics and physico-physiology, chiefly optical, so that the poor brother on the street might see better or more comfortably. And the field of medicine, per se, is not to be excused for much of its former apathy and apparent lack of appreciation of the importance of matters of vision. But, during the past decade or two, pre-professional and professional curricula have been developed to the point that practitioners of medicine have been better trained in the fundamental sciences, so that they have been cognizant of the fact that they are indebted—and how much it would be difficult to estimate—to the chemists, physiologists, physicists, psychologists and others who deal in and with true and reasonably exact sciences with but little of the so-called "art" and "rule of thumb" or empiricism attached. Hence I refer to the *physicists* —to men like Southall—and their contributions. And some of these leaders in the field of vision have remained physicists pure and simple, and have left it for others to develop the complementary and equally important (or perchance more important from some standpoints) *physiological* aspects; so that we often refer to optics and physiology as we do to the two arms and hands united to a body, each indispensable the one to the other.

And in the years that have come and gone since the introduction of the first two-year course in optometry (1910) in Columbia University and since the time Southall came to serve as director of the professional courses in optometry, we have seen the courses in both university and independent schools (the courses in the Columbia University, Pennsylvania State College, Massachusetts School, Ohio State University, Northern Illinois College, Los Angeles School, Southern College and the University of California in this country are recognized by the Council of Education) advanced to a minimum of four years, with adequate training required in the basic sciences and supplemented by at least two and in general three years of strictly professional courses. Optometry owes its progress to its educators and forward-looking leaders and can point at the present time with considerable pride to its schools and colleges, their teaching staffs, their research and the development of their courses, to the end that there has been a quarter of a century of progress undreamed of by the fathers and the pioneers.

And, furthermore, while writing in this vein, let me say of Professor Southall, as well as of others whose names need not be cited, that he was always and still is a true friend and supporter of the inherent goodness of the training for and practices of optometry; optometry as it should be and must be if it is to serve its function, irrespective of how it may be affiliated or associated with other applied biological sciences or what its immediate future may be. Southall once wrote me: "For many years I have been a true and loyal friend of that cause ever since I first espoused it. In all my associations with optometry I have been above reproach. I believed in it from the beginning and I believe in it now." I am sure that he and others like him have felt that optometry needed friends and at times needed them very badly, for the reason that performance, though loudly acclaimed to be superior, was often quite distantly related, if related at all, to the skill and ability actually needed to do a thorough-going piece of work. It is always to be remembered that a true and loyal friend is not always one who says, "Yes, yes," and pats you on the back, but rather one who, from the logic of his head and the desires of his heart, speaks the truth as he sees it and understands it. No leader and no man in a position of trust looks down on or removes himself wholly from his associates in everyday life, but he often needs a delivery from them in order that he may look up to them.

Since it was not my privilege to be with Professor Southall except on occasion and since, therefore, I am unable to write of him as a teacher in a classroom—which is, after all is said and done, the chief job and life work of one who is a member of an institution of learning—I must turn to my acquaintance with him through the medium of the printed page. Southall's writings evidence that meticulous care and striving for accuracy which are the earmarks of the real scientist. Each theorem or each topic discussed was treated by him as a word picture and all of the details were filled in as an artist would painstakingly complete his composition. I think it is this very exactness, persnicketiness, or whatever you want to call it, that causes the physicist to be looked up to for his ability but often looked down on as absolutely impossible of being understood and as lacking in the milk of human kindness to the "n"th degree. The golden age in which we have lived has been and still is passing away from us for better or for worse. Those were the days when every boy with some wire and a tube became a radio engineer, when every fellow who would read a newspaper account for five minutes believed that he could "out-Einstein" Einstein. Those were the days when those who did not know enough to descend from the mountain tops, and dwell in the valleys where one worked, were tricked into the belief that "mathematics was for the millions" and other things like unto mathematics, and that, unless it could all be put in such language that a child could understand, then a great error had been committed and it was not a "fair deal" and not "democracy." At any rate, the conclusion was often drawn that, if one couldn't understand it, it wasn't worth understanding. So it follows that most of the really worth-while things that must be acquired in order to make outstanding professional men and occasional "giants in the earth" are acquired by only a handful.

And I have to say in truthfulness that most of us, including the professors, have difficulties with the signs and symbols and with intricate equations, and we may question whether or not we do not frequently fail to see the beauty of the landscape as a whole simply because our mind's eyes are kept focused on all the little details. So the mathematics and physics of the optical system of the eye, as given in such an excellent way by Southall, should be mastered, not because one will ever prescribe for a Gullstrand's schematic eye, for example, but because the processes of thinking involved in this and other allied topics in catoptrics and dioptrics give one power to "think without confusion, clearly." But all of us can read, enjoy and profit by such chapters as

"Rod Vision and Cone Vision" or "Temporal and Spatial Reactions to the Organ of Vision" in his treatise on *Physiological Optics* published by the Oxford University Press in 1937. A knowledge of the phenomena and tests on dark adaptation, as presented in such a treatise, will serve as a very satisfactory antidote to much of the misinformation rampant these days.

It is said that one doesn't know a man until he goes fishing with him. And this "fishing" need not be too literally piscatorial in character. For on such trips few fish are caught; but there are many exchanges of ideas and opinions and much evidence is acquired as to just what kind of a man your companion may be. Various individuals in Columbia went on various indoor "trips" with Professor Southall; they exchanged ideas with him and acquired much evidence of just what kind of a man he is. Professor Herman W. Farwell, his associate in physics, tells us something about Southall as he and others knew him:

"Professor Southall brought to Columbia a kind of tradition which years have not dispelled, that of a scholar and gentleman of the old school. Not that modern conditions do not produce both scholarly gentlemen and gentlemanly scholars, but these are more in the newer tempo. Southall had always held true to the thorough training founded on the classics, yet he has not insisted that all education must necessarily follow the steps of the earliest period. His main point has been that whatever else it be, it must be thorough.

"With many men education is a kind of garment to be donned at will, when the occasion requires, or for purposes of display, in a sort of Easter parade. Not so with Southall; his education has been as much a part of him as his very eyes, and so he has contended it should be with other men. His poise and his dignity are no less a part of him; there is nothing put on; it is all a part of the real man.

"No occasion could emphasize this more than did that one not long after he first came to Columbia when, during a visit to an industrial plant, he was asked to speak to a regular gathering of the foremen. Few men would have dared to do what Southall did, and still fewer would have succeeded as he did. Yet he simply spoke directly to them, neither talking down to them, nor talking up to them. He spoke carefully, as man to man, taking it for granted that they would accept him as he had accepted them. He did not omit reference to things that he had read, though undoubtedly they had not read as widely as he.

He may even have used a Latin phrase or two. But he made his point. Here was a man using words really to convey ideas, and, with no tricks or sham, obviously giving of himself to them."

It may seem strange indeed to conclude a biographical sketch of a great leader in optics in general, and in optometry in particular, with references to the fiendishness of the devils of hell rampant in the earth and with comments on the thinness of the veneer of civilization. But, in Southall's simple faith and his ability to carry on, septuagenarian though he be, as expressed in that 5 April 1941 letter, there will come to many of us of advancing years and grey hairs, as well as to the generation which must now take over in large measure, a bolstering reassurance. For he wrote in that friendly visit: "It has been a dark winter through which we have passed, and every day my heart has been filled with misgivings whenever I looked at the newspapers and realized the fateful issues that were hanging in the balance and are hanging in the balance at this moment, with the destiny of civilization at stake. In order to keep my mind off this nightmare, I have sought solace in the supreme uplands of mathematics and composed a book on projective geometry which has given me unalloyed pleasure many days and many nights when, alas!, better men than I, nay even women and children, were being blasted from the skies above their heads, with everything crumbling in ruins over their bodies. Milton calmed his impatience when, thinking of his own frustration, he exclaimed

*'They also serve who stand and wait.'* "

So, in a world of confusion, men like Professor Southall *stand*. Never once has he (or others like him) faltered in his life-long devotion to science—science, that should have led his fellow men and, in due time and in faith, will lead them to the life more abundant. And I am sure that he has been a true scholar always, and that there are few men living who have a firmer grasp of their subject in all its ramifications. And I am equally sure that this laborer in the vineyard of science would be the first to deny these judgments of his friends, because he would say that the first fruit of knowledge is humility—humility like that of Sir Isaac Newton who, at the end of life, deplored his vast ignorance.

James P. C. Southall will remain to us ever as a genuine scholar, well known by and beloved by relatively few, modest, never looking for nor desirous of the plaudits of the multitude, conscious and appreciative at all times of the fact that there were gifts which he possessed which

could best be used in the bestowal of information through the medium of the printed page and in the classic shades of the four walls of the college and university. Yes, there were giants in the earth in those days—Helmholtz, Donders, Hering, von Kries, Landolt and others who have joined "the innumerable caravan that moves toward that mysterious realm." Yes, there are giants in the earth today, not the least of whom is our colleague Southall, and their names, as they are gathered to their fathers, will be called "blessed." Yea, also, there will be giants in the earth of tomorrow; great leaders, great scientists, great professional men and great ministers to the ills and sicknesses of the body and of the soul. Yea: there will be men of vision.

# ACCOMMODATION AND AUTONOMIC INNERVATION OF THE ANTERIOR SEGMENT OF THE EYE*

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While in recent years there has been little controversy concerning the innervation of the iris, the situation as far as the innervation of the ciliary body is concerned has not been as satisfactory. Before considering the present status of the innervation of the ciliary body specifically, a brief review of the present knowledge of innervation to the iris will be made.

In the human, the organs innervated by the autonomic nervous system usually are reciprocally innervated by the sympathetic and parasympathetic division of this system.[1] As far as physiologic function is concerned these systems are mutually antagonistic.

Historically, it was believed at first that the physiological control of the iris was dependent entirely upon the parasympathetic nervous system through innervation passing to the sphincter of the iris by way of the parasympathetic fibers of the third cranial nerve. Later, after more detailed histological studies of the bleached iris had been made, and more information concerning the autonomic nervous system obtained, realization that a further group of smooth muscle fibers, innervated by the sympathetic nervous system and known as the dilator of the pupil, played an important part in the control of pupillary size. Still later[2]

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1. Exceptions to this rule occur in the case of the sweat glands and in the pilomotor function of the hair in which apparently only the sympathetic nervous system seems to function.
2. J. E. Gullberg, J. M. D. Olmsted and I. H. Wagman. Proceedings Society for Experimental Biology and Medicine, 616, 38, 1938.

it was found that the action of the iris was such as to enforce the action of the dilator, and that in the completely denervated iris the pupil was dilated under the action of the elastic tissue in the iris alone. Thus there is available a complete description of the control of pupillary size and in this description the reciprocal innervation by the parasympathetic and sympathetic nervous systems plays the dominant role.

The physiological control of the ciliary body until quite recently has been less clear. Since the function of accommodation plays such an important part in visual perception, and since it is controlled by the ciliary body, the actual innervation of this latter structure assumes some importance.

The von Helmholtz theory of accommodation, after being modified several times, stated essentially that distance focus of the eye occurs with so-called relaxation of the ciliary body which places a tension upon the suspensory ligament of the lens such that the lens becomes flattened in an antero-posterior direction, thus reducing the total refractive power of the eye and adapting it for distance vision. For clear observation of near objects the total refractive power of the eye must increase, and this occurs by the reduction of tension upon the suspensory ligament allowing the lens capsule to mold the lens substance into a thicker form having a more highly curved anterior and slightly more curved posterior surface. This change in lens form gives the required increase in refractive power. The reduction in tension upon the suspensory ligament in the latter case is brought about by innervation of the circular fibers of the ciliary body by way of the parasympathetic fibers of the third cranial nerve. Presumably, it is the cessation of this innervation which allowed the ciliary body, by relaxing, to increase the tension on the suspensory ligament in the former case, thus accommodating the eye for distance vision. In passing, it might be stated that the initial and controlling sensory stimuli for either of these processes to take place apparently results from cortical recognition of blurred imagery upon the retina. Either of these above processes continues until clear retinal imagery is obtained.

It is seen from the above discussion that on the basis of this theory the innervational control of the ciliary body is dependent upon the parasympathetic nervous system and constitutes the only example in the human of an organ innervated solely by the parasympathetic. This anomalous situation has troubled physiologists for years, and while a

number have suggested that the above theory was inadequate, no conclusive evidence has been available until recently for its modification.

The ciliary body is composed largely of smooth muscle fibers. These fibers are usually divided into three main groups: (1) those which run concentrically with the equator of the lens are known as circular fibers, (2) those which run in an antero-posterior direction along the sclera are called longitudinal fibers, and (3) those fibers which have a direction inclined to both the circular and longitudinal fibers and are called radial fibers. While the function of the circular fibers is well known, the function of the other two is less well known if one postulates that the ciliary body be innervated by the parasympathetic only.

Henderson in his Doyne Memorial Lecture[3] on the basis of comparative anatomic studies of the ciliary body in herbivore, carnivore, and primates comes to the conclusion that at least the longitudinal fibers of the ciliary body and possibly the radial fibers as well must be innervated by the sympathetic nervous system in order to have functional significance.

Assuming Henderson's conclusion, which was based largely upon presumptive evidence physiologically speaking, one eliminates the hiatus of unitary innervation of the ciliary body by the parasympathetic that has been a matter of concern to physiologists.

In 1937 Cogan[4] of Harvard reviewed the status of the autonomic innervation to the ciliary body and, on the basis of the effect of certain ophthalmological drugs upon ciliary function, and the effect of certain lesions that interrupted the innervation to eye, confirmed and to a certain extent amplified Henderson's conclusions.

Consideration of the relative mechanical advantage of the several groups of smooth muscle fibers in the ciliary body results in the conclusion that the effect of the circular fibers must predominate, and tends to mask the contribution of the longitudinal and radial fibers. However, it seems that a critical experiment could be devised to demonstrate directly and definitely any effect of sympathetic innervation on ciliary function. Recently this has been done by Olmsted, Morgan and Wattrous.[5,6,7]

3. Thomas Henderson, Transactions of the Ophthalmological Society of the United Kingdom; 280, XLVI, 1926.
4. David G. Cogan, Archives of Ophthalmology; 739, 18, 1937.
5. J. M. D. Olmsted and M. W. Morgan, Jr., American Journal of Physiology; 602, 127, 1939.
6. M. W. Morgan, Jr., J. M. D. Olmsted, and W. G. Wattrous, American Journal of Physiology; 588, 128, 1940.
7. J. M. D. Olmsted and M. W. Morgan, Jr., American Journal of Physiology; 720, 133, 1941.

The experiment performed by Morgan, Olmsted and Wattrous was the most direct and obvious one. In experimental animals, which included the rabbit, cat, dog, and the monkey, the third cranial nerve was sectioned intra-cranially at the point of exit from the brain stem. The cervical sympathetic chain on the same side was sectioned just distal to the superior cervical ganglion. These surgical procedures and subsequent experimental procedures were performed under a variety of anesthetics for details of which the reader is referred to the original papers.

After section of these nervous pathways a period of recovery from the currents of injury resulting from the cutting of the nerves was permitted. The refractive state of the eye was then determined by skiascopy and recorded. This was called the basic refractive state relative to which all changes in refraction were referred. It is the refractive state of the eye with a completely denervated iris and ciliary body.

Faradic electrical stimulation of the third cranial nerve was then performed. The refractive state with this stimulus was determined and recorded. A period of recovery was then allowed, followed by stimulation of the cervical sympathetic chain distal to the surgical section. The refractive state for these conditions was then determined. Variations in the sequence of the above procedures were made in order to eliminate empirical factors.

The result of these experiments showed that the stimulation of the parasympathetic resulted in an increase in the refractive power of the eye relative to the so-called basic refractive power and stimulation of the sympathetic chain resulted in a relative decrease in refractive power.

Further experiments were performed leaving the parasympathetic intact. Sympathetic stimulation under these conditions also resulted in a reduction of refractive power. The paralysis of parasympathetic function by the use of atropine followed by sympathetic stimulation also resulted in a reduction in refractive power of the eye.

These experiments show directly that the sympathetic nervous system is involved in a dynamic way in the control of accommodation and acts always in such a way as to decrease the refractive power of the eye.

The magnitudes of the change in refractive power with stimulation of the two branches of the autonomic nervous system are quite dissimilar. Maximal stimulation of the parasympathetic fibers of the third

cranial nerve shows an increase in refractive power of the eye between 7 and 14 diopters relative to the basic refractive state; while maximal stimulation of the sympathetic results in approximately one diopter of reduction in total refractive power relative to the basic. Thus the effect of parasympathetic innervation on an average is roughly ten times as great and opposite in direction to the action of the sympathetic innervation. This is in agreement with Henderson's discussion of the relative mechanical advantage of the circular fibers and the longitudinal fibers, and on the basis of this experimental work Henderson's hypothesis that the longitudinal fibers of the ciliary body and possibly the radial are innervated by the sympathetic seems justified.[8]

Certain of these experiments were repeated making use of the Purkinje-Sanson images reflected from the surfaces of the lens; and also in actual photography of the profile of the anterior and posterior lens surfaces when the lens is illuminated obliquely with a thin beam of light from a slit-lamp. The latter method of showing change in the refractive power of the lens has been completely described by Fincham.[9]

The result of these experiments give a result similar to the previous ones and eliminate uncertainties that might arise from the use of skiascopy alone in the determination of refractive change.

While these experiments show definitely the reciprocal innervation of the ciliary body by the autonomic nervous system in certain mammals it seemed desirable to perform some experiments upon human subjects. Cogan[4] had performed some experiments upon human subjects using certain adrenergic and cholinergic drugs. For example, when the effect of the parasympathetic upon the ciliary body had been temporarily eliminated by the use of atropine and the refractive state determined, the effect of adrenaline instilled into the conjunctival sac was such as to decrease the refractive power of the eye. Adrenaline acts upon smooth muscle innervated by the sympathetic in an analogous way to actual sympathetic innervation, hence this experiment is presumptive evidence of some sympathetic effect in ciliary innervation. However, since the effect of drugs many times is variable, and conclusions drawn from such experiments occasionally open to criticism, observations without the use of drugs seemed indicated.

8. J. M. D. Olmsted and M. W. Morgan, Jr., American Journal of Physiology; 720, 133, 1941.
9. C. F. Fincham, Transactions Ophthalmological Society of the United Kingdom; 145, 140, 1935.

Morgan and Olmsted[10] performed experiments upon human subjects by observing the refractive state of the eye constantly, making use of skiascopy. During this observation sympathetic stimulation of the ciliary body was induced by unexpected sensory shocks. The change in the refractive state of the eye in these subjects was around a quarter or a half of a diopter and constituted a reduction in the refractive power of the eye.

All of this evidence establishes fairly definitely the fact of dual control of focus in eye by both branches of the autonomic nervous system. Innervation by the parasympathetic by way of fibers accompanying the third cranial nerve results in an increase of the refractive power of the eye and innervation by the sympathetic results in a decrease of the refractive power of the eye relative to the basic refractive state. The magnitude of change associated with parasympathetic innervation is roughly ten times as great as that associated with sympathetic innervation to the ciliary body. It is not the purpose of this paper to discuss the effects of such innervation upon real and pseudo (or induced) ametropic states of the eye. A detailed consideration of real and induced ametropia in the light of the above information will be the subject of a further paper.

10. M. W. Morgan, Jr., and J. D. M. Olmsted, Proceedings of the Society for Experimental Biology and Medicine; 612, 42, 1939.

# THE PROXIMAL FACTOR IN ACCOMMODATION AND CONVERGENCE*

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## INTRODUCTION AND PROBLEM

In the clinical use of stereoscopes[1,2,3] and commercial orthoptic devices for visual training, the eyes as a rule show a greater tendency to converge when looking into the stereoscope, than when looking at a distant target, although the rays of light entering the eyes are alike in both cases. Similar discrepancies are found in comparing the phorias taken "at distance" with the phorias taken through +2.50 D. lenses when the target is at 40 cm. This effect of the proximity of the target is referred to as proximal convergence.

In a clinical measurement of a large number of cases Tait[4] compared the distance phorias with the phorias at 33 cm. through +3.00 D. lenses and attributed the differences to the "proximal sense." These differences gave a statistical average of 5.8△ of convergence.

A practical application of this phenomenon is described by Cantonnet[5] when he recommends the use of "mental effort" as an aid in the treatment of squint. His method was to instruct an esotrope to think of a distant object above his horizon when attempting to place his eyes in relative divergence. Similarly, he would instruct an exotrope to think of a near object below his horizon to make his eyes converge. Further application of the awareness of nearness are its consideration in the analysis of convergence as a reading problem,[6] and in the attempts to make arbitrary allowances in commercial stereoscope cards for measur-

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ing phorias. Other references to this factor include the use of the term "directional complement" by Atkinson,[7] and "psychic complement" by Carl Shephard.[7]

The awareness of nearness has not only been regarded as a factor in convergence but also in accommodation.

Landolt[8] speaks of the various monocular optometers as having the disadvantage of provoking an effort of accommodation because of the awareness of the proximity of the target. He makes the statement that it is a well known observation that a person not accustomed to looking through an optical instrument makes an involuntary effort to accommodate. He cites this as the principal cause of the fatigue produced by the use of opera glasses, microscopes, and magnifying glasses, and considers one proof of this the fact that such individuals *see very small* with these instruments. He further explains that the size attributed by the observer to the object depends upon the distance to which he refers it, or to which he projects his retinal image, and that the distance of projection depends, for the untrained eye, especially upon the state of its accommodation.

A reduction in visual acuity, as measured by the Betts test, is attributed by Molish and Reese[9] to the psychological stimulus to accommodation provided by the stereoscope. Neumuller[3] points out the influence of the proximity of the target in the comparison of the far point of accommodation as measured with a stereoscope with that obtained by conventional refraction methods.

Data provided by Kurtz[10] show the effect this factor has on accommodation. He finds the average monocular tolerance of plus lenses to be considerably less than +3.00 D. with the reading card placed at 33 cm. from the spectacle plane. Since his subjects were corrected for distance the failure to completely relax the accommodation through the +3.00 D. lenses can be attributed to proximal accommodation.

In a comprehensive discussion of the effects of nearness on the visual functions, namely, pupillary action, accommodation, and convergence, Duke-Elder[11] refers to the "near reflex" but does not attempt to separate the awareness of nearness as a stimulus from the physical changes in the stimulus involved in increasing the proximity of the point of fixation. His term "near reflex" is intended to correspond to the "Naheinstellungsreaktion" employed by Behr (1924).

The investigations referred to above abundantly demonstrate the existence of both proximal accommodation and proximal convergence but no one seems to have considered to what extent these phenomena depend one upon the other. It is safe to assume that if there is any accommodation resulting from the awareness of nearness of the point of regard, this accommodation would induce a certain amount of accommodative convergence. And since the eye has a relatively extensive depth of focus, the eyes could over accommodate as a result of the awareness of distance without producing a noticeable blur and the resultant accommodative convergence might be interpreted clinically as proximal convergence unaccompanied by changes in accommodation. In that case the refractionist could not determine whether the measured proximal convergence represents purely an extra-ocular muscle problem, a ciliary muscle problem, or both.

APPARATUS

The instrument used for making all measurements is represented in Fig. 1. O.D. and O.S. are respectively the right and left eyes of the

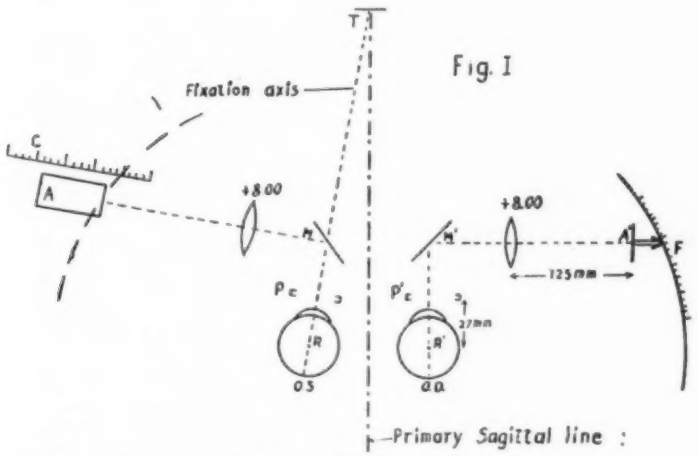


Fig. 1—DIAGRAM OF APPARATUS.

subject with their respective centers of rotation located approximately at the points R and R′ which lie 27 mm. behind the auxiliary lens holders P and P′. The transparent half-silvered front-surface mirror M and the opaque, completely-silvered front-surface mirror M′ are tilted to make angles of 45° with the fixation axes. The focal point of the +8.00 D. lens on either side falls at the entrance pupil of the eye. This

arrangement permits the use of a short and almost linear dioptric scale at C and keeps constant the apparent size and apparent brightness of the slit at A and the dots at A′.

The front end of the device at A is a black surface with a narrow vertical slit at its center. This device projects two narrow beams of light through the pupil of the subject's left eye, the light from the upper half of the slit forming a narrow beam which passes through the temporal side of the pupil and the light from the lower half of the slit forming a second narrow beam which passes through the nasal side of the pupil. When the vertical slit (A) appears unbroken it lies at the conjugate focus of the retina, and the dioptric value of the accommodation in play can be read on scale C. Since the lateral separation of the two narrow beams of light at the pupil remains fixed at two mm. regardless of the distance of the slit (A) from the eye, the size of the pupil has no effect on the accommodation reading. The reading represents a measure of the accommodation in the horizontal meridian only. The scale C, the slit A, lenses, and transparent mirror are rotated with the left arm of the haploscope around the pivot R to superimpose the image of the slit on the fixation target T.

The target at A′ consists of a pair of 2 mm. white luminous apertures on a black field, vertically separated by a distance of 10 mm., and is mounted, together with the lenses and opaque mirror, on the right arm of the haploscope. There is nothing in the field of view of the right eye that can be fused with anything in the field of view of the left eye. The pointer on scale F indicates the degrees of rotation of the right arm of the haploscope around its pivot R′. The distance between R and R′ is made to correspond with the subject's interpupillary distance.

The "distant" fixation target (T) is centered on the primary sagittal line 5.0 meters from the lens holder (P). The target consists of a Snellen acuity chart mounted on a 1 meter square black background.

The "near" fixation target is placed on the primary sagittal line .345 meters from the lens holder (P). The near target consists of a photograph of the distant target reduced to obtain the same apparent size, and illuminated to obtain approximately equal brightness. The near and distant fixation targets are thus distinguishable only by their

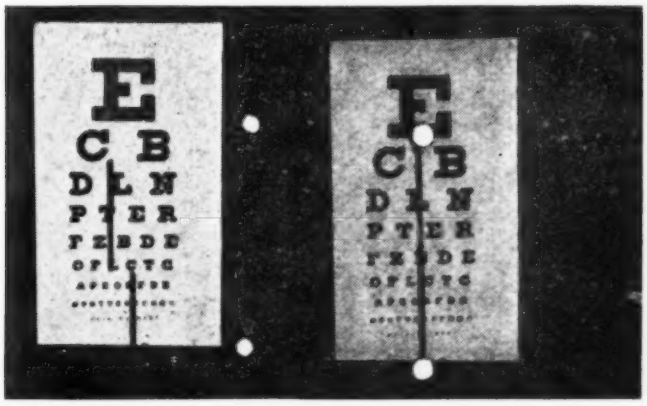

Fig. 2—PATTERN AS SEEN BY THE SUBJECT.
The vertical luminous slit is represented by black lines. Left: target letters clear, vertical slit broken, and luminous dots to one side. Right: target letters clear, vertical slit unbroken, and dots properly centered for a reading.

distance, which can be determined by their relative positions with respect to miscellaneous objects in the room.

Fig. 2 illustrates the composite binocular impression obtained by the subject as he looks into the instrument. The subjects were fully aware that the targets were mounted at the actual distances described above but of course it cannot be presumed that the perceived distances corresponded to the actual distances. But it is logical to suppose that the awareness of the actual distance might to some extent affect the perceived distance.

PROCEDURE

Twenty-eight seniors in optometry were used as subjects. Each subject wore his habitual glasses and, after proper alignment of the instrument, was instructed to fixate and keep clear the smallest readable row of letters on the chart and simultaneously center the two white spots on the chart by constantly adjusting the right arm of the haploscope. (See Fig. 2.) While doing this he also observed the slit which the operator was moving forward or backward and reported when it appeared unbroken. At this point the readings were made. Several practice trials were given and the instructions were repeated until the subject felt that he had mastered the technique.

At the beginning of the first setting the right arm of the haploscope was placed several degrees divergent to the expected phoria finding and

the slit A was started at the far end of scale C. At the beginning of the second setting the right arm was placed several degrees convergent to the expected phoria finding and the slit A was started at the near end of scale C. Each of these procedures was repeated once and the averages of the four resulting settings were taken as the measurements of the accommodation and convergence for a given combination of target distance and auxiliary lenses. The accommodation was read in diopters on scale C and the convergence in degrees on scale F.

The stimulus to accommodation for each target distance was controlled by auxiliary lenses used as indicated in Tables I and II. The alternate auxiliary lenses indicated in the tables were selected at random and the subject was not informed as to the power inserted. The order of auxiliary lenses was irregular for both target distances. The measurements were taken with the near target first in half of the cases and with the distance target first in the other half.

The net accommodation of the eye was determined by deducting the value of the auxiliary lenses from the average scale reading. Likewise by adding the degrees of inward rotation of the left eye, a constant determined by the position of the Snellen chart and the subject's interpupillary distance, to the average convergence obtained on scale F, the total convergence was determined. A typical graph of these findings is illustrated in Fig. 3.

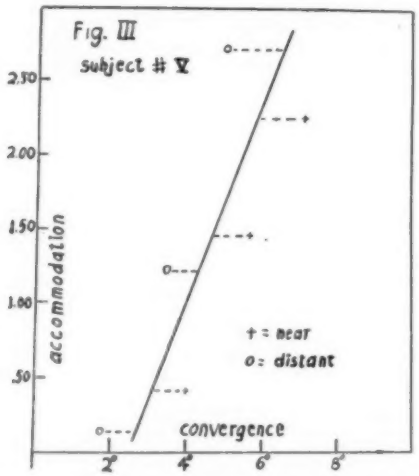


Fig. 3—THE ACCOMMODATION AND CONVERGENCE OF SUBJECT NO. V.

RESULTS

The results of each individual were plotted as in Fig. 3. Assuming a linear correlation between accommodation and convergence, a straight line may be drawn in by inspection to represent the line of regression[12] of the six findings. The slope of this line gives a measure of the convergence associated with accommodation. This relationship is referred to in Fig. 3 as accommodative convergence and is expressed in degrees of convergence per diopter of accommodation.

The figure also illustrates a greater amount of convergence for the near target than for the distant target. This increase is referred to as proximal convergence and is represented graphically by the lateral displacement of the "near" finding with respect to the "distant" findings. A representative value for proximal convergence may be computed by adding the average length of the dotted lines between the crosses and the regression line to the average length of those between the circles and the regression line. If a "+" is located to the left, or a "o" to the right of the regression line, the length of the dotted line connecting either value to the regression line is given a minus value in computing the proximal convergence. The computed value for the case in Fig. 3 is 2.1 degrees.

It should be noted that proximal convergence computed as described above represents the amount of convergence which is found to be solely dependent upon a change in the awareness of nearness, because the method used excludes any convergence which might be associated with changes in accommodation.

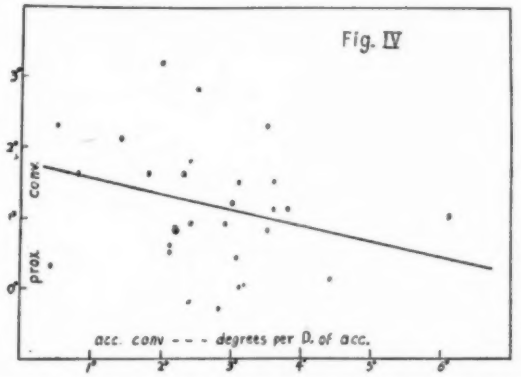


Fig. 4—THE PROXIMAL AND ACCOMMODATIVE CONVERGENCE OF 28 SUBJECTS.
The statistical regression line is in solid black.

Both the accommodative convergence and proximal convergence have been evaluated for each subject. All of the subjects manifested a positive amount of accommodative convergence. The mean for the group is 2.60° per diopter of accommodation with a standard deviation of ±1.17°. The distribution is shown in Fig. 4. Twenty-five of the subjects manifested a positive amount of proximal convergence, one averaged a zero amount, while two indicated —.2° and —.3° respectively. The distribution is likewise shown in Fig. 4. The mean for the group is 1.21° with a standard deviation of ±0.94°.

Another statistical observation to be made is the correlation of —.267 between accommodative convergence and proximal convergence. Inasmuch as individuals exhibiting little accommodative convergence would necessarily have to maintain single binocular vision at near by means of a greater amount of extra-ocular muscle innervation from sources not associated with accommodation, such innervation could

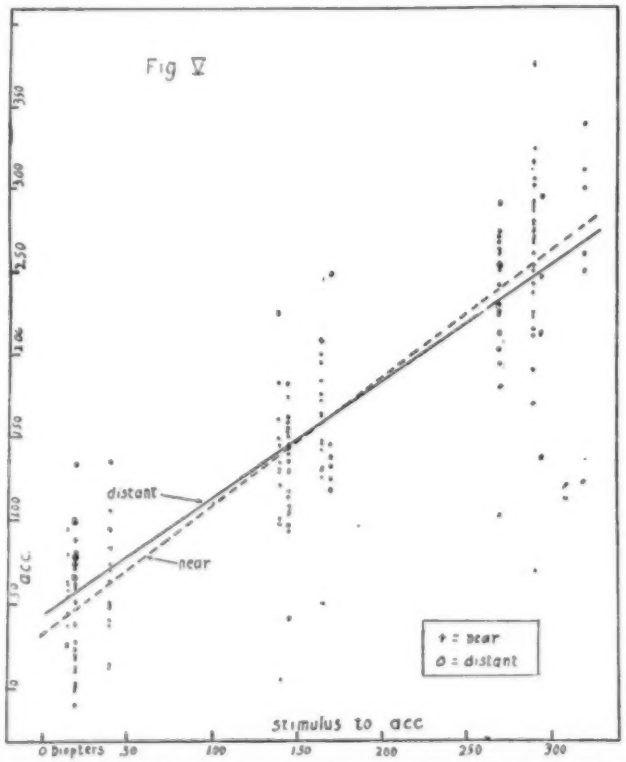


Fig. 5—THE ACCOMMODATION INDUCED BY VARIOUS AMOUNTS OF DIOPTRIC STIMULUS TO ACCOMMODATION FOR BOTH THE DISTANT AND THE NEAR TARGET.

readily be conditioned to the awareness of nearness. If such can be postulated, the correlation is quite in order.

Furthermore the experiment provides data which bear upon the problem of whether the awareness of nearness affects accommodation. The findings of the first twenty-five cases tested are plotted in Fig. 5. The abscissae represent the various stimuli to accommodation as obtained from Tables I and II, while the ordinates indicate the accommodation measured for each stimulus. The solid line represents the line of regression[12] of the accommodative responses for the distant target (circles), and the broken line represents the accommodative responses for the near target (crosses).

We see that the lines are practically coincident. If there were any proximal accommodation present, the broken line should be consistently higher than the solid line. The failure to obtain evidence of proximal accommodation can probably be attributed to the fact that the subjects were experienced in the use of optical instruments and had previously performed a number of experiments that dealt with the problems of accommodation.

*Table I. Lenses Used With Distant Target*

| Auxiliary Lenses | Net Stimulus to Accommodation |
|---|---|
| 0 | — .20 D. |
| —1.25 or | —1.45 |
| —1.50 | —1.70 |
| —2.50 or | —2.70 |
| —2.75 or | —2.95 |
| —3.00 | —3.20 |

*Table II. Lenses Used With Near Target*

| Auxiliary Lenses | Net Stimulus to Accommodation |
|---|---|
| 0 | —2.90 |
| 1.25 or | —1.65 |
| 1.50 | —1.40 |
| 2.50 or | —0.40 |
| 2.75 | —0.15 |

The difference in slopes of the two lines is not statistically significant.

The writer wishes to express acknowledgment for the assistance obtained under the Sheard Foundation Research Program, and for the careful supervision of the project by Dr. Glenn A. Fry.

## CONCLUSION

1. This experiment demonstrates that the awareness of nearness of the point of fixation is effective in bringing about changes in convergence which are independent of changes in accommodation.

2. The results indicate that there is a negative correlation between proximal convergence and accommodative convergence, such that an individual having little accommodative convergence may be expected to exhibit more than average proximal convergence.

3. A statistical analysis of the data shows that there is no difference in the amount of accommodation induced by a change in target distance as compared to an equivalent change in the power of the lens mounted before the eye. In other words, the data provide no evidence for proximal accommodation.

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## THE OPTOMETRIST'S RESPONSIBILITY IN A PERIOD OF WAR

Platitudinous palaver aside, the optometrist's public responsibility is almost non-existent.

This is so, not because he is unwilling or incapable of shouldering what should be his share of responsibility but because of the closed-door policy maintained by a strongly intrenched bureaucratic opposition.

Hence, as matters stand, the optometrist need recognize but one responsibility—one responsibility to his country, to those called upon to defend that country and to his profession—not the responsibility which first springs to mind but the responsibility which stands back of that one—the responsibility of exposing and overthrowing that baneful

influence wielded by a coterie intent on thwarting, at any cost, Optometry's preferment.

Hundreds, thousands, millions of visual tests to be administered; highly developed skill essential to their proper administration; speed and accuracy of utmost importance, and these tests seriously impeded and slighted by those who in many instances have had less than 100 hours' training in eye-work in their medical courses! Against this lies untapped a reserve of thousands of optometrists who have had at least 2000 hours' training in the very branches of eye-work most serviceable in the preparatory period of war.

And this issue is as nothing compared to that of binocular rehabilitation.

Is the average medical eye-examiner qualified? Who knows? He takes no State Board examination in eye-work. The optometrist establishes his qualifications by passing a State Board examination specifically in eye-work.

Here, then, is a burning question: Why does the Government of the United States, begging for all-out effort, sanction a politico-medical group rejecting the services of the highly-trained, State-qualified, State-licensed optometrist?

And from this springs the initial *"responsibility"* which the optometrist must face—the responsibility of exposing the hypocrisy and relative inadequacy of those who prevent the competent optometrist from rendering the services he is pre-eminently fitted to render.

Considering Government's present policy in relation to Optometry, Optometry's present policy in relation to Government presents a picture of pusillanimous chauvinism.

Two steps are essential to the effective establishment of a sound policy. One interprofessional, the other political.

The first step calls for coordinated action by the more truly representative group in Ophthalmology and the more truly representative group in Optometry. These two groups are aware of each other's existence and, properly motivated, will function constructively.

Their respective fields of potential effectiveness have lain fallow for years. Details need not be arrayed. None but the willfully blind, on either side, can fail to see the promise inherent in a joint board charged with the duty, and clothed with the authority, of devising a just and practical plan of cooperation under which both Optometry and Ophthalmology may contribute their best to the general welfare.

A board composed of Dr. Walter B. Lancaster, Dr. Howard C. Doane and Dr. Charles Sheard would be received, in our opinion, with universal acclaim, barring a few with axes to grind.

Under the guidance of such a board the second step may be taken. This consists in demanding through proper political channels that the present discrimination against Optometry, *per se,* be exposed and terminated and that the optometrist and the services he is so well qualified to render be recognized, respected and utilized—fully, openly and immediately.

Optometry has tolerated unjust discrimination too long. A more opportune moment may never present itself to batter down the jealous, vindictive and, now, unpatriotic element which stands in the way of Optometry meeting her full responsibility of examining eyes and prescribing corrective measures wherever in this broad land or on the broader seas eyes are to be examined and corrective measures applied.

Thus, the optometrist's fundamental responsibility is the establishment of his right to shoulder his share of responsibility in eyework. Drs. Lancaster, Doane and Sheard can bring about the establishment of that right. There is no question about this. The question is whether Optometry, or a sufficiently large section of it, will take the issue seriously enough to agree to meet the ethical standards which, we all know, must be exacted as the price of recognition.

Drs. Ryer and Hotaling.

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## SPECIAL REPORTS

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### THE PRESIDENT'S ADDRESS*

Arthur P. Wheelock
Des Moines, Iowa

The American Academy of Optometry is starting a new year, which incidentally will be its 21st anniversary year. I am very happy to participate as President at this annual meeting, and I have been look-

*Presented at the annual meeting of the American Academy of Optometry, at Chicago, Illinois, December 7, 1941, for publication in the February, 1942, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

ing forward to it. There is something of home about being here, because I know I am meeting old friends with understanding minds, who throughout the year have been confronted with the same problems as myself; the same difficulties, the same heartaches, the same gratifications, but here before this Academy we can speak, knowing that if we should say something which is not strictly parliamentary or endowed with the enfolding mantles of apology, it will be understood as the thoughts of a man talking to his fellowmen of active and interesting problems confronting all of us.

I wish to congratulate the new Fellows who have completed the course of study and have passed the examination. You have worked hard and I know you will never regret having done so. Your appearance here indicates that you have applied yourself earnestly.

The really great men are those who have contributed most liberally of their services to mankind. You may not get rich in worldly goods in your profession, but you have a golden opportunity to enrich your lives through unselfish service to others. The criterion of your success will be if you have served well and faithfully your fellowmen. The Academy needs you today more than ever before. I know you will not fail.

All of us, together as members of this profession and forming this Academy, assume responsibilities. Some of those who are not members of this group look to us for their safe-keeping and the future of the profession of which we are all a part—OPTOMETRY. No field of public service has made more rapid advances than that of our profession. Recent years have witnessed an increasing desire on the part of optometrists in every section of the land and in other countries to affiliate with this Academy.

Today is a critical hour in world history. You and I are today witnessing the passing parade of world events that will loom large in shaping, not only the maps of the world, but perhaps the very destiny of our own blessed land. Therefore, the situations which now confront us demand the exercise of dispassionate judgment and our best thoughts and experiences.

Optometry is now somewhat divided, but it is my hope and belief that out of all this, we will make it in the final battles more aggressive and more determined. Professional Optometry must appeal to

the conscience and judgment of the individual optometrist in every state in the union. This is in accordance with the principles upon which this Academy was founded and the objects for which it contends. We will accept this issue.

Our problems this year have been somewhat the same as were confronting presidents long before me. Of course, conditions change and it is well to review, possibly with a different approach.

Dr. Melvin stated in 1933 in Baltimore that the future progress of our profession depended upon the number of optometrists who will embrace and live up to Academy ideals and principles. This is true today, and I wish to report that the matter of membership is being ably handled, and it is my wish that this work be continued.

In 1934, the President suggested something be done about the inactivity between the time of our annual meetings. As a remedy, he thought that problems for investigation should be assigned to Fellows who would work them out in their own offices. This was again suggested by Dr. Neumueller who in 1939 submitted a very fine plan for us to follow. This is an important activity to promote interest and to bring out papers more to the practical side. It is my hope that this will again be brought up for action by the planning committee.

In 1936, President Walker felt that an Academy award should be presented to the honor student in each school for the best thesis on ethics and professional practice. These fine suggestions should be carried out this coming year, because we have sensed for a long time the need of familiarizing students with the Academy.

The past year has been a busy one for those who assumed the responsibilities as officers and committee men—the work that had been assigned to them has been heavy. There has been no faltering and progress has been made. There has been no attempt to work miracles but only true constructive thoughts have made it possible to contribute to accomplishments.

At this time I wish to pay tribute to Dr. Don R. Paine who as past President has never for one minute relaxed his attention to Academy affairs. We have been so very fortunate to have had the opportunity to carry on the work that had been planned by his committee under his leadership—a sterling character with years of experience devoted to building a great organization.

My deepest gratitude goes to Dr. J. Fred Andreae who as Secretary has made my work in Academy affairs most enjoyable. I cannot express in words my appreciation for the splendid cooperation that has come from his office and of the vast amount of help that he has given to all of us who when elected to offices were novices.

To the other officers, the committee men, the Board of Regents, the Editorial Staff, the Board of Examiners, I wish to express my warmest thanks for their alertness, good judgment, physical and moral courage and business efficiency. We have no place for self sufficiency, petty jealousy and lack of cooperation; therefore, unification among committees has been achieved and they work together to provide the type of organization that is expected by you. In these changes, all of you have been a progressive and guiding force.

I have constantly kept in mind the responsibility which you entrusted with me as President. It has been a most eventful year for me, and may I close by acknowledging the honor and to thank you.

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## BRITISH OPTOMETRISTS ESTABLISH JOINT WAR EMERGENCY COMMITTEE*

I. Parnum
London, England

Before embarking on any account of the British refractionists' contribution to the war effort, we should like to say with what interest we have read of our American colleagues' activities in this sphere, and in particular their success in obtaining commissions in the Naval Reserve. Presumably, as the struggle develops into a "shooting" war, the part they are called upon to play will become even greater, and we wish them all success.

Even before the outbreak of hostilities, our Joint War Emergency Committee was formed to deal with the optical and ocular problems arising out of war conditions. It represents the profession as a whole, the members being elected from seven organizations, including four

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*The Author of this Report is the Assistant Registrar of the Joint Council of Qualified Opticians 65 Brook Street, London, W. I., England. Submitted on November 28, 1941, for publication in the February, 1942, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

academic or examining bodies and two political organizations, one of which is our own. Although the industry is not represented on the Committee, there is close cooperation with the manufacturing side.

Similarly a Scottish War Emergency Committee has been formed of the various optical organizations in Scotland. Both Committees are in direct touch with the Ministry of Health.

The Joint War Emergency Committee, although it technically has no executive powers, has accomplished much valuable work which is widely recognized and appreciated by Government departments and other bodies. Its greatest success has been in the pre-enlistment training and recommendation of optometrists for the Royal Army Ordnance Corps, where their standard of education, ability, and knowledge of instruments have placed them in great demand. Many have been promoted to commissioned rank and hold responsible positions in both teaching and executive capacities.

Other achievements have been the supply of gas-mask spectacles to the Forces, A.R.P. services, Police, etc., the equipping of Observer posts with binoculars, and the organization of courses on ocular first aid.

Although some optometrists have been enlisted into the Royal Army Medical Corps, it has not been possible for them to undertake refraction officially, in spite of the fact that there is a shortage of ophthalmologists and the utilization of optometrists in their proper capacity would release a number of these for other work.

The Joint War Emergency Committee, which by its very constitution has no funds of its own, is supported by its constituent bodies. Consequently, when the heavy raids of last winter and spring wrecked the premises of many optometrists, and one firm, for instance, received hits on five separate establishments in one area at the same time, the alleviation of this distress became the province of our own organization.

It occurred to those in control of the Joint Council of Qualified Opticians that it might be possible to raise a fund for this purpose and it happened that this organization was in a position to do so in such a manner as to distribute equitably the burden of finding the necessary funds and to make prompt payments to those needing help, with suffi-

cient privacy to avoid the embarrassment which the more sensitive among the recipients might otherwise feel.

Among its many activities the Joint Council of Qualified Opticians acts as a Clearing House between the optometrists who undertake the refraction and provision of glasses to insured persons entitled to Ophthalmic Benefit under the National Health Insurance Scheme, and the Approved Societies which under the Ministry of Health are responsible for the administration of the scheme.

The cost of running the Clearing House and the other activities of the Joint Council of Qualified Opticians is met by a levy on the amount of the National Health Insurance business done by optometrists who avail themselves of the facilities offered by the Clearing House.

May we, in conclusion, in sending cordial greetings to our fellow optometrists across the seas, express the hope that the heroic fight put up by the Russian people and the immense effort which Britain, with the cooperation of her self-governing Dominions and with the highly-valued assistance the United States of America is making on the sea, on land and in the air, crush, before they succeed in reaching your shores, the evil forces which have spread ruin in our cities, destroyed so many of our historic buildings and enslaved the greater part of Europe.

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## PROCEDURE AND INSTRUMENTATION

by Guy L. DuPlessis

A department wherein discussions will be carried on relative to the value of various experimental and clinical techniques as employed by practicing optometrists, and also in which the instruments used by optometrists in various phases of their work, will be subjected to some critical evaluation.

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## PRIORITIES AND OPTICAL SUPPLIES

The dislocating effects of war were first felt in the optical industry in the United States during the year 1941. For the first time in history manufacturers refused orders for ophthalmic materials. The sharp upturn in business activity created a substantial demand for lenses and frames. The injection of speculative purchases expanded the demand beyond available stocks and manufacturing capacities. As a result, manufacturers discouraged "hoarding" by refusing orders of an obviously speculative nature.

This minor difficulty is now dwarfed by the prospective shortage of metals used in the manufacture of frames; abrasives and glass for the manufacture of lenses; and paper for packaging these products.

Most manufacturers have already reduced or discontinued production of machinery and technical ophthalmic equipment. Spectacle frame production too has been affected by OPM allotments of nickel and copper to the optical industry.

Fortunately ophthalmic production is classed under the Health Supply Rating Plan and as such is indirectly a defense industry. Therefore a continuation of much ophthalmic production is assured though on a smaller scale and subject to allocations by the OPM.

The optometrist who does his own dispensing can adjust himself to the new situation by adopting the suggestions offered by the Optical Wholesalers National Association, which are as follows: (1) Try to standardize in your fitting of frames. In order to conserve for urgent military and civilian needs the manufacturers under the direction of OPM are practicing curtailment of styles and are urging simplification of all lines of materials. (2) Anticipate your needs but do not overbuy. (3) Do not destroy wrapping tissue paper or mailing boxes. Optometrists are urged to save these and return them to the laboratories from which they buy their materials.

As far as frames are concerned, we are told that these new regulations will mean reducing pink gold-filled frame lines to a minimum representative number of styles, and the reduction will probably also affect the lines of white gold-filled frames. White metal alloy frame lines will also be restricted to a limited number of styles by each manufacturer.

In addition it might be well to reflect that the laboratory prescription shop will, in the future, be undermanned because of military service and that this will result in a slower prescription service. The British Optical Industry has carried on admirably under more difficult war conditions than we will ever be subjected to and presents an excellent example for us to follow.

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## THE LANCASTER VISUAL ACUITY CHARTS

These charts, manufactured by the *American Optical Company*, were designed by Walter B. Lancaster, M.D., for visual acuity testing.

While they do not employ new principles, they do embody certain features making them a useful adjunct to refracting equipment.

The charts are printed on both sides of each card and are contained in a loose-leaf binder that can be placed on a table or suspended from a wall. The number of characters and groups prevents memorizing by the patient. The characters are computed metrically and the increase in size from one row of characters to the next is in increments of 25 per cent.

The construction of these charts and their compactness should make their use ideal in cases where the patient is refracted in his own home.

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## TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

by J. Fred Andreae, Secretary

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

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## ACADEMY APPOINTMENTS

On January 1, 1942, President Arthur P. Wheelock announced the appointments of the following standing committees of the American Academy of Optometry.

*Advisory Board.* Dr. D. R. Paine, Topeka, Chairman; Dr. R. M. Hall, Cleveland; Dr. E. E. Hotaling, New York City; Dr. C. C. Koch, Minneapolis, and Dr. O. J. Melvin, Omaha.

*Research Fellowship Committee.* Dr. Albert Fitch, Philadelphia, Chairman; Dr. E. A. Hutchinson, Los Angeles, and Dr. W. B. Needles, Chicago.

*Membership Committee.* Dr. William Greenspon, Bluefield, W. Va., Chairman; Dr. J. A. Seifert, Detroit, and Dr. Glenn Winslow, Los Angeles.

*Terminology and Standards Committee.* Dr. Glenn A. Fry, Columbus, Chairman; Dr. R. C. Baxter, Warren, O.; Dr. Brant Clark, San Jose, Calif., and Dr. L. Treleaven, New York City.

*Reading Disability Problem Committee.* Dr. Geo. A. Parkins, Ord, Nebr., Chairman; Dr. Nelson Greeman, San Antonio, and Dr. Sherrett S. Titus, Kansas City.

*Editorial Council.* Dr. A. P. Wheelock, Des Moines, Chairman; Dr. J. Fred Andreae, Baltimore; Dr. R. J. Beitel, Jr., Southbridge, Mass.; Dr. Howard C. Doane, Boston; Dr. Glenn A. Fry, Columbus; Dr. G. O. Ohlsson, Detroit; Dr. D. R. Paine, Topeka, and Dr. E. LeRoy Ryer, New York City.

*Associate Editorial Referees.* Dr. R. E. Bannon, Hanover, N. H.; Dr. Brant Clark, San Jose, Calif.; Dr. M. T. Eberl, Milwaukee; Dr. Wm. Feinbloom, New York City; Dr. R. M. Hall, Cleveland; Dr. E. E. Hotaling, New York City; Dr. D. G. Hummel, Cleveland; Dr. O. J. Melvin, Omaha; Dr. F. K. Moss, Cleveland; Dr. Julius Neumueller, Philadelphia; Dr. Ernest Petry, Rochester, N. Y., and Dr. Charles Sheard, Rochester, Minn.

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## ANNOUNCEMENT OF PROGRAM COMMITTEE

It is quite possible that the American Academy of Optometry may meet at an earlier date than December in 1942. Fellows who expect to present papers at the annual meeting should take notice of this, and start preparing their material at this time.

When the time and place of the annual meeting are announced, the final date for acceptance of papers will be published in this department.

All of the Fellows are requested to consider the program as their own and to aid the Program Committee by now informing the committee of papers to be presented at this meeting.

D. G. Hummel, Chairman,
Program Committee.

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## ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list, although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics.
12. Miscellaneous.

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### 8. INSTRUMENTS.

THE LUCKIESH-MOSS TEST CHART ILLUMINATOR. Luckiesh, M., and Moss, F. K. American Journal of Ophthalmology, 1941 (Sept.) 24, 1061-1062.

This illumination is designed to illuminate the standard (1932) test chart of the A. M. A. to a uniform brightness of 10 foot-lamberts with a manufacturing tolerance of $\pm 2$ foot-lamberts. The average brightness of various areas of the chart does not exceed 5% in either the vertical or horizontal direction. Details are given together with an illustration. —R.J.B.

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THE USE OF THE OPHTHALMOSCOPE. McCuaig, G. A. Canadian Optometrist. 1941, 2, 12, 361-362.

McCuaig reviews in detail the techniques of making both the direct and indirect ophthalmoscopic examination of the media and fundus of an eye without using a mydriatic to dilate the pupil.—C.C.K.

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DISTANCE OBJECT TEST TYPE FOR CHILDREN. Preston, F. E. British Journal of Ophthalmology, 1941, 25, 357-360.

Preston describes his test chart which contains drawings of familiar objects constructed on the principle of the Snellen notation for visual acuity. The choice of the objects was determined by actual practical trial with children in different parts of the country. Those objects which were most easily interpreted by the greatest number of children were the ones retained for use on the chart.—R.J.B.

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TRIAL LENSES AND TRIAL FRAMES. Poser, M. Optical Journal and Review of Optometry. 1941, LXXVIII, 22, 23.

The German physician Fronmueller was the first to develop a trial case and trial frame. This was done around 1843. It was not until 1881 that these aids in vision testing became at all common. Poser presents a brief historical review of the development of the trial case and trial frame from that date to the present time.—C.C.K.

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TWO NEW VISUAL TEST CHARTS. Eggers, H. Archives of Ophthalmology, 1941 (July) 26, 71-78.

Eggers discusses the theoretic basis for visual test charts, astigmatic fans and dials and submits a description and specifications for two charts which he has found useful as supplements to the various charts available commercially.—R.J.B.

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9. HYGIENE AND ILLUMINATION.

CONTACT COVER LENSES IN THE REHABILITATION OF PATIENTS WITH SCARRED AND BLIND EYES. Adams, E. Optometric Weekly. 1941, 32, 38, 1078-1080.

Contact cover lenses are indicated in most cases where an eye has been scarred, disfigured or blinded but where the globe of the eye is still intact and free from pathology. Adams presents a case report in which is outlined the technique of making and fitting these contact cover lenses to restore to the patient the normal appearance of an eye. —C.C.K.

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FUNCTIONAL LIGHTING IN THE COLLEGE. Kraehenbuehl, J. O. Sight-Saving Review. 1941, 9, 1, 13-31.

The author discusses the problem of lighting in college as related to the ocular health and comfort of students who are compelled to spend night hours in study. The subject of fluorescent lighting is included in this report in some detail, and the author seems to have some doubt as to the value of this new lighting unit. He also points out that under certain conditions a footcandle meter may not take proper readings with fluorescent lighting units.—C.C.K.

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EYESTRAIN A MAJOR CAUSE OF INDUSTRIAL FATIGUE. Hardy, W. E. Optician, (London). 1941, 101, 2610, 125.

Every worker over 40 who is engaged in close-work operations in industry is a potential victim of eyestrain, which is a major cause of industrial fatigue. This is true also of many younger persons and the authors recommend an immediate investigation of this problem on two major fronts, (1) that of industrial lighting and (2) a full visual survey of every industry working under black-out conditions on war materials.—C.C.K.

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10. APPLIED AND PHYSICAL OPTICS

PLACEMENT OF OPTICAL CENTERS IN SINGLE VISION LENSES. Fry, G. A., and Ellerbrock, V. Optometric Weekly. 1941, 32, 33, 933-936.

The authors propose a new method for specifying the tilt of a lens before an eye. They attempt to evaluate the importance of the factors which should be considered in choosing the level of the lens for its optical center. They point out that the relation of the tilt of the lens and the position of the optic axis with respect to the center of rotation of the eye is of great importance. They find that, in average corrections, the prismatic effects at the lens margin are of little importance in choosing the level of optical centers for lenses.—C.C.K.

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11. EDUCATION, SOCIOLOGY AND ECONOMICS

THE DEMANDS OF THE SERVICES. Rugg-Gunn, A. British Journal of Ophthalmology, 1941, 25 (December), 590-592.

In a letter to the editors, Rugg-Gunn emphasizes the increasing demand for ophthalmic "specialists" in the services. There are now seven standards of visual acuity and owing to the great demands placed upon visual acuity by mechanized warfare ocular fatigue is readily enduced. In the modern army repeated refraction work and re-grading of the men are constantly necessary. "To add to the difficulty, there is some reluctance on the part of regular medical officers to specialize in ophthalmology." Rugg-Gunn proposes that sight-testing opticians (optometrists) be recruited to work under the direction of a surgeon, after undergoing a preliminary course specially designed for them. He suggests that

they should have Warrant Officer rank, with the prospect of promotion to commissioned rank as Second Lieutenants, R.A.M.C.—R.J.B.

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STATE-WIDE SAFETY PROJECT INAUGURATED IN STATE HOUSE. Stone, F. Indiana Optometrist. 1941, 13, 12, 3-5.

Three hundred persons were given ocular screen tests under the auspices of the Indiana Drivers License Department and the Indiana Association of Optometrists. The persons examined were beginners who were applying for a drivers license for the first time. The tests employed were (1) visual acuity, (2) distance judgment, (3) fields of vision, and (4) color vision. Of the 300 who took the tests, 11 failed in visual acuity; 30 failed in distance judgment; 4 failed in field tests, and 6 failed in color vision tests. The standards of grading the applicants were not presented by Stone.—C.C.K.

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OPTOMETRY'S PLACE IN THE CONTROL OF GLAUCOMA. Hill, J. F. Bulletin of the Optometrical Society of the City of New York. 1941, 7, 3, 4.

Hill urges optometric support for the prevention of glaucoma campaign now undertaken by the National Society for the Prevention of Blindness. Hill suggests (1) that optometrists arrange refresher courses in the recognition of the symptoms and diagnostic signs which accompany glaucoma. (2) That every optometrist become thoroughly proficient in the diagnosis of this condition, and (3) that every optometrist be in close touch with one or more good ophthalmologists with whom he can work on these cases.—C.C.K.

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12. MISCELLANEOUS

THE ARTIFICIAL EYE INDUSTRY IN AMERICA. Gougelman, P. Eye, Ear, Nose and Throat Monthly. 1941, 20, 10, 308-309.

Artificial eyes have been made in America since 1851. Up to the present time the raw glass, in tube form, which is used in artificial eye making has come from Germany, with the actual process of making the eyes, being done here. Gougelman anticipates the early development of American made glass tubes, thus freeing this country entirely from European sources of supply.—C.C.K.

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CHEMICAL WARFARE. Morris, J. W. Refractionist, (London). 1941, 30, 519, 33-43.

In the forty-three months of the first World War over 50 different war gases were used by the belligerents. Only a dozen or so of these achieved any measure of success. According to one authority some 125,-000 tons of war gases were used and the total casualties resulting from this use were 1,295,853 or 4.6 per cent of all battle casualties. This figure includes both minor as well as major casualties. Gas accounted for but 1.32 per cent of all battle deaths. During the first World War it is estimated that an average of 192 pounds of gas were used for every gas casualty.

The author claims, in this, the second World War, that the three main belligerents have enormous stores of war gases, but these have not as yet been employed. However, troops for carrying out chemical warfare have been trained and both the fighting services and the civil population are equipped with respirators. The author then classifies war gases from the chemical, physical and physiological standpoints. —C.C.K.

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SPECTACLES MENTIONED IN MEDIEVAL LITERATURE. Barnett, A. Optician, (London). 1941, CII, 2629, 24.

Barnett finds that the early English poet Chaucer (1340-1400) was the first author to mention spectacles in general literature apart from the technical writings of that period. Early quotations dealing with spectacles and visual disorders from the writings of Chaucer, Hoccleve, Lydgate, Desiderius, Morison, Foxe, Newbery and others are given.—C.C.K.

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GOOD EYESIGHT AND THE WAR EFFORT. Cole, J. Refractionist (London), 1941, 30, 524, 173-178.

Cole reviews the position of the optometrist in the broad plan of national war effort, wherein the visual needs of the civil population are in great part left in the hands of members of the optometric profession. Cole finds this particularly true regarding the visual requirements of industry wherein physical disabilities can and do arise from faulty visual functioning. Subnormal vision, asthenopia, headaches and the more remote visual symptoms such as drowsiness and giddiness all

make workers accident prone and materially reduce production. The author advises unified optometric action by our societies in now solving the visual problems of industry.—C. C. K.

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Current Comments by Carel C. Koch

A Monthly Department

in which the Editor of the AMERICAN JOURNAL OF OPTOMETRY & ARCHIVES OF THE AMERICAN ACADEMY OF OPTOMETRY will discuss items of news of general interest: such as relate to new instruments, clinical techniques, education, public health, and optometric legislative and organization problems.

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## EYE CONSERVATION PROGRAMS

During the past several years there has developed among optometrists a growing feeling that as an organized group we should be actively engaged in various types of public relations work to make the public more eye conscious and to acquaint all citizens of America with the facts relative to proper and adequate eye care. Some good work in this field has already been done by both our national association and some state and local associations. It remains for us, however, to have these early efforts properly coordinated, and to put greater stress on the entire program by means of central planning and more adequate financial backing. Through plans recently announced by the American Optometric Association, one may infer that this entire program may soon get under way and it is hoped that these will be given the full financial support which they merit.

It is well to note, however, that while the American Optometric Association has been getting its public relations program under way that certain independent groups have been doing some interesting and sound work in the field of eye conservation which, at least indirectly, has been very beneficial to all optometrists. To be sure we have not always been in agreement with the methods employed or the approaches used by some of these groups, but in the main the work they have done has been received favorably by the public, to the advantage of optometrists.

It is essential therefore that while optometrists actively support the public relations program now being developed by the American Optometric Association that they also continue their support and interest in the ocular promotional activities which have been carried on in

the past. And, which we hope will be continued in the future by the individual groups already mentioned, these being several in number.

For instance, much valuable general promotional work has been done during the past several years by certain optical manufacturers who have been advising ocular care in their advertisements addressed to the general public. Advertisements covering a wide segment of our population and of considerable value in a broad program of eye conservation.

Additional fine radio, lecture and pamphlet work has been done by the Better Vision Institute, an organization jointly supported by optometrists and optical manufacturers, under the supervision of Mr. M. J. Julian. And while this has been going on, the Better Light—Better Sight Bureau has developed a widespread program in which visual care is advised through the medium of billboards, posters, radio programs and booklets of various sorts. This latter program is financed by Electric Utilities in various communities.

In addition to the foregoing, the National Society for the Prevention of Blindness has carried on an extensive program of visual education largely through press releases and the printed word in their organ, the SIGHT SAVING REVIEW, a quarterly circulated largely among educators and social workers. While we as optometrists may not entirely favor the attitude of this latter organization towards our profession, it must be admitted that much of its propaganda has value to us all as refractionists.

As the American Optometric Association gets its public relations program under way these other educational media can be used to supplement the work of our national association. Each program mentioned is contributing much of value and each deserves the consideration and support of optometrists as all are working towards the common goal of making America Eye Conscious.

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## EDITORIAL NOTICE TO CONTRIBUTORS

The American Journal of Optometry and Archives of American Academy of Optometry is a monthly journal, published in annual volumes of about six hundred pages of reading matter each, illustrated where necessary, by cuts in the text.

About one-half of the space is devoted to technical articles, and the remaining half is given over to special departments, editorials, abstracts and book reviews, all of them original.

The papers and reports are original and are accepted only with the understanding that they are to be published in this journal exclusively.

The editors of the American Journal of Optometry and Archives of American Academy of Optometry beg to offer the following suggestions to authors who propose to favor them with the publication of their contributions:

I. Write on one side of the paper. Double-spaced, typewritten MS. is preferred.

II. Words to be printed in *italics* should be underscored once, in SMALL CAPS twice, and in LARGE CAPITALS three times. **Antique type** when called for should be so marked.

III. Be sure that the title of your paper indicates its contents. Should the subject be a general one, for instance, Case Reports, it would be well to mention the subject of each special report—for instance: Case One. Progressive Myopia with Exophoria. Case 2. Divergent Squint with Amblyopia. These special titles will appear in the table of contents of each number.

IV. Illustrations should be carefully drawn with India Ink on separate sheets.

V. When authors receive proofs for revision, they should correct and return these without delay. We beg, however, to remind our contributors that changes in the manuscript necessitates resetting, this causing much additional expense, so we ask that alterations be limited to what is of essential importance.

VI. Because of the added cost, we have discontinued the giving of gratuitous reprints to our authors, but we will supply them with these at the cost of press work and paper where so desired. The following tables of charges will apply for the year 1942.

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Prices for greater numbers furnished on request. Orders for reprints should be placed at the head of the manuscript, or should at the latest reach us before the Journal has gone to press.

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# *Announcement*

## To Optometrists in the Armed Services of the United States

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It is hoped that this annual, below-cost-rate may assist in keeping these optometrists in touch with professional life and contemporary refractive thought while they are in the service of their country.

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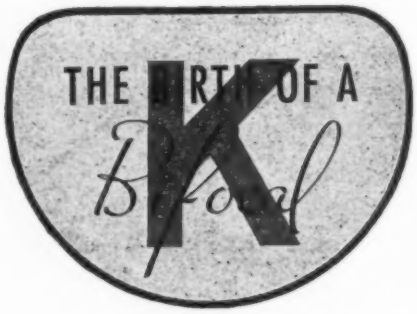


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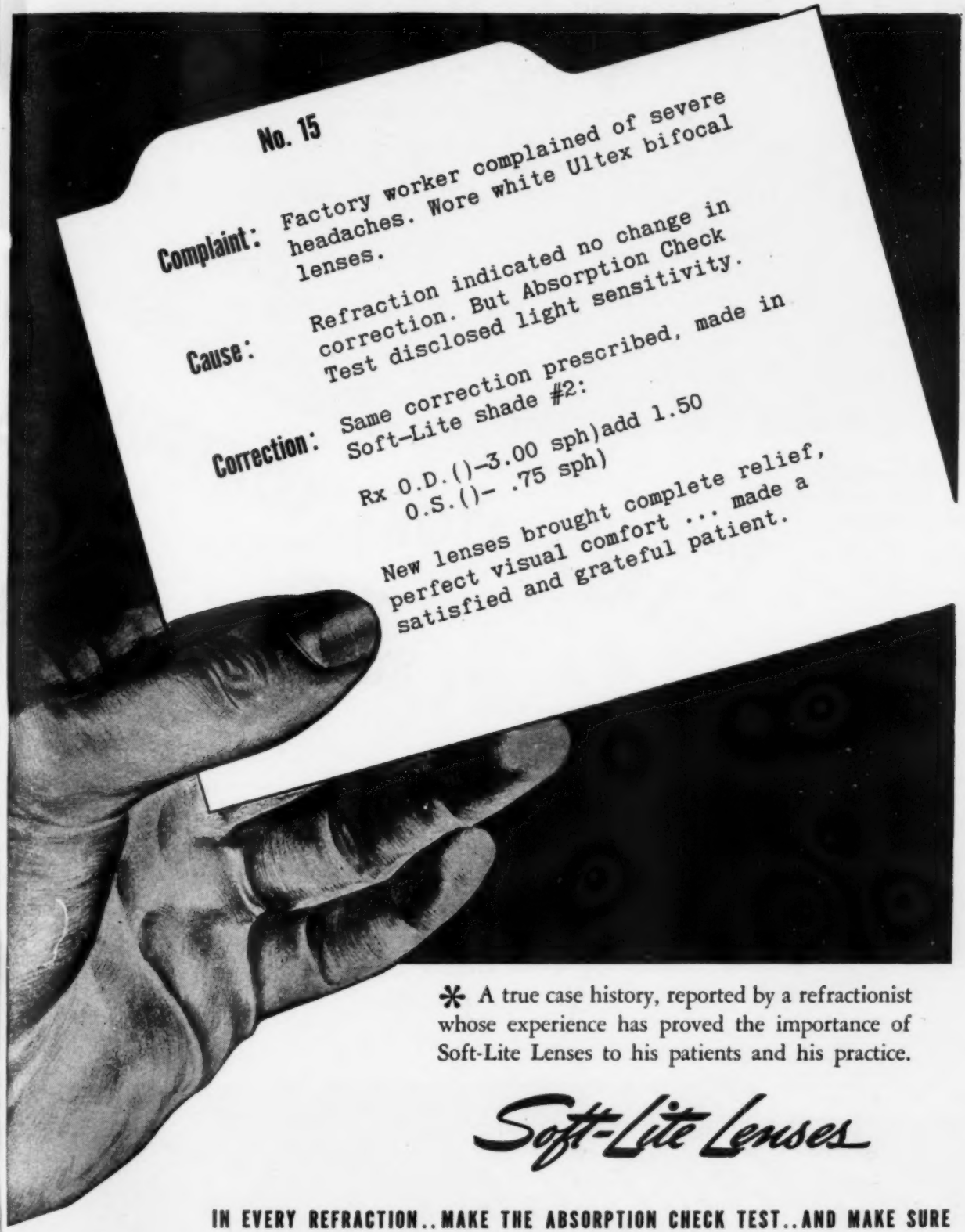
# Case History Nº 15*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Complaint: Factory worker complained of severe headaches. Wore white Ultex bifocal lenses.
Cause: Refraction indicated no change in correction. But Absorption Check Test disclosed light sensitivity.
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